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ABSTRACT

This fastback, a booklet bound "left-handed," is designed to help educators become aware of the problems faced by left-handed students in school and to suggest ways that many of the problems might be solved. Following an introduction discussing a personal experience with left-handedness, the booklet continues with a brief history of the treatment of left-handed people, noting that in Western countries there has always been pressure to use the right hand, as illustrated by the negative use of the word "left" and by efforts to change the handedness of children. Research and theories regarding handedness are then discussed, including views on lateral dominance and findings from genetic studies. The booklet describes school problems encountered by left-handed students in reading and writing, as well as problems encountered in using equipment designed for right-handed persons, especially in manual arts, music, business, and physical education classes. Problems with self-esteem that may result from these difficulties are also discussed. The booklet then presents ways teachers can alleviate difficulties in writing instruction by identifying left-handed students and planning special support and instructional techniques for teaching handwriting, while avoiding undue attention. The booklet suggests that the reading needs of left-handers may be met by closely observing left-handers, for whom the left-to-right direction may seem unnatural, and that vocational and physical education needs may be met by obtaining left-handed tools and by using mirroring as an instructional strategy. The booklet concludes with an essay by Benjamin Franklin regarding the pressures placed on left-handers. Contains 22 references. (KDFB)

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Left-Handed Students: A Forgotten Minority

by
Evelyn B. Kelly

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Editor's Note

When you picked up this fastback, you probably thought that it was printed upside down or backwards. That confusion was purposeful. In fact, this fastback is printed in the normal fashion, but the binding is different.

Books, magazines, brochures, and other publications in our culture are right-handed. That is, when laid flat with the front up, a book is bound on the left with the pages opening to the right. Books are intended to be held in the "less dexterous" left hand, while the pages are turned with the "more dexterous" right hand. Obviously, this is a right-handed orientation.

This fastback is about some of the problems that lefties encounter in school because of our culture's pervasive right-handed bias. Therefore, to demonstrate how assumptions about handedness either facilitate or inhibit everyday activities, such as reading, this fastback is bound "left-handed." Everything else is the same as in any fastback. But that simple act of binding the fastback on the "wrong" side may help readers better realize some of the challenges faced by their left-handed students.

Introduction

All left-handed people, move over next to the window," my fourth-grade teacher said. "We will turn your desks in the opposite direction from the class so that your hands will not shade your paper." I hated it. It made me different.

Perhaps Gardner (1945) gave the best description of left-handed people: "There is nothing in the least 'unnatural' or 'peculiar' about being left-handed; there is something about it, however, that is *different* from being right-handed."

Actually, I should have been grateful that someone in that Knoxville, Tennessee, school system in the mid-1940s cared. In retrospect, I am thankful to the teacher who showed me how to turn my paper to the right and how to point the end of my pencil toward my shoulder. And I do not recall anyone suggesting that I change hands.

Other "lefties" often were not so lucky. Horror stories of tying down a student's left hand, or worse, abound in some areas. Most teachers in the United States now agree that it is neither necessary nor desirable to try to

change left-handers into right-handers, but few realize how difficult school life can be for these students. Are "lefties" a forgotten minority?

And how many people are left-handed? The answer should be a simple count. However, statistics reveal wide disagreement in all phases of "laterality," the technical term for "handedness." Some experts believe that up to 30% of the population may have left-handed tendencies. Others estimate that between 4% and 8% are left-handed. Questions of ambidexterity and degrees of left- or right-handedness complicate the issue. A true count is impossible. But one finding is consistent: There are more left-handed boys than left-handed girls.

My own informal research on the problems of lefties in school produced some interesting results. Not long ago I was assigned to write an article for *Lefthander Magazine* on "Left-Handers' Experiences in School." From a single request for anecdotes placed on a newspaper bulletin board, I received 50 responses. The callers ranged in age from 10 to 77 and were educated in school systems throughout the United States. Their responses were informative and extended my thinking about the problems of lefties.

The purpose of this fastback is to help educators become aware of some of the problems that left-handed students face in school and how many of those problems can be solved.

A Brief History

History in general has not been kind to left-handers. Plato in *The Laws* discussed the pressure to change left-handed people into right-handed. In Western countries there always has been social pressure to use the right hand for most things.

Our language illustrates this point. In English the term *left* often signifies something that is "far-out," extreme, or disparaging. Examples are "left-wing," "out in left field," and "a left-handed compliment." The English word *left* comes from the Anglo-Saxon word *luft*, meaning "broken" or "weak." The French word for left is *gauche*, which English speakers have adopted to mean "uncouth, lacking social grace, clumsy." Readers who remember their Latin will recall that left is *sinistra*, which is the root of the English word *sinister*. Similar negative connotations also occur in other languages. The German word for left-handed is *linkish*, which also means "awkward." And in Russia to be called left-handed — *levja* — is an insult.

In 1587 Francis Clement wrote *The Petie Schole*, the first handwriting manual published in English. Clem-

ent instructed the student to "hold the pen in your right hande." To prevent any misunderstanding, the author provided a drawing of a right hand holding a pen. The left-handed writer simply was not considered.

Robert Hertz, in a book called *Death and the Right Hand* (1960), traces the dominance of the right side of the body back to primitive religions and beliefs about the origins of the universe. The feeling throughout history has been that the "left hand that is too gifted and agile is the sign of a nature contrary to order, of a perverse and devilish disposition; every left-handed person is a possible sorcerer, justly to be distrusted" (p.103).

An Elizabeth, New Jersey, newspaper headline for 20 November 1922 announced: "Left-Handedness Cured Among Pupils in School." The article that followed described how the "disease of left-handedness" had been almost stamped out. An intensive campaign to "cure" left-handedness in the local schools had reduced the lefties from 250 in 1919 to only 66 in 1922.

Other researchers weighed in. Hollingsworth in 1923 noted that criminals, "defectives," and the insane were reported to have an undue proportion of left-handers. West in 1927 said that in teaching handwriting "the left-handed, the mirror manuscript writer, the subnormal, and the physically defective child should be lumped together" (Coren 1992).

Training to change the "handedness" of children continued in some areas until the middle of the 20th century. Gertrude Hildreth, a professor of education at Brooklyn College, argued as late as 1950 that the "best rule" was "not to let the child get started in left-

handedness for any skill he is likely to use steadily, that is eating, writing, sewing and using household tools." She went on to say that nursery school children "should not be permitted to make choices in handedness for basic skills" (Coren 1992, pp. 55-56).

Fortunately, the negative views of left-handedness gradually have changed. The left-handed student in today's schools tends not to be actively harassed for his or her left-handedness. But, less fortunately, neither does the left-handed student receive much help to cope with the right-handed assumptions that dictate much of the physical environment in which he or she must study, work, and live.

Why Are Some People Left-Handed?

In spite of a lack of any firm definition of "handedness," about 90% of all humans might be considered predominately right-handed. This means that they prefer to use their right hand in performing most tasks. Only a few people are truly ambidextrous, and most of them manifest a clear division of labor between their hands.

The right-sided tendency, which extends to the rest of the body, is species-specific to humans. Animals exhibit left- or right-sidedness equally. For example, cats and monkeys are right- or left-handed (pawed) in approximately equal numbers. Only among humans do roughly nine out of ten prefer the right hand. A child's favored hand may become apparent as early as eight months, and by age three the preference usually is well-developed.

Brain Theories

This human difference may arise from the advanced development of the human brain. The left hemisphere

of the human brain is usually dominant. Researchers do not know why. But the nervous system is structured so that the left hemisphere controls the right side of the body. Sometimes, the hemispheres of the brain appear to exert equal influence; but in left-handed individuals the right side of the brain is dominant. Researchers also have found that left-handed and ambidextrous individuals have a thicker corpus collosum (the fiber bundle linking the left and right hemispheres). And, as a group, left-handed individuals seem to exhibit a wider range of various traits than do right-handed persons.

Neurological research has determined that the hemispheres of the brain process different kinds of information. The left hemisphere of the brain is the center for language, science, mathematics, and logic. The right side of the brain synthesizes and is a source of dreams, fantasies, art, music, and feeling. This "two brain" theory reasons that if certain attributes are processed in a certain hemisphere of the brain, then the person using the hand controlled by that side of the brain will show those characteristics. For example, a right-handed person will demonstrate greater interest in language or mathematics. The left-hander will be "right-brained" and thus more likely to exhibit interest or talent in the arts.

On the other hand, some scientists argue that right- and left-brain dominance does not extend to handedness. They contend that the abilities of left-handers are as diverse as those of right-handers. And academic abilities are related more to other factors, such as intelligence, talent, and background, than to handedness.

Related to brain dominance theories is the notion that left-handedness is produced by a brain abnormality. Many left-handers, for example, are adept at "mirror writing" — that is, writing backwards. The most famous example is Leonardo da Vinci, who was left-handed and produced notebooks filled with mirror writing. Historians disagree about why da Vinci wrote as he did, whether to keep his journals secret or merely as a convenient manner of writing.

Are left-handers' brains organized differently from right-handers? Or does brain damage in some way cause individuals to be left-handed? Some researchers are pursuing the idea that a neural defect causes left-handedness. These theorists believe that right-handedness is part of the human genetic program, in the same way as standing upright, for example. They suggest a couple of possible causes for left-handedness. One is that the blood supplied to the left hemisphere of the brain may be diminished during fetal growth. Such "blood starvation" causes the right hemisphere to develop more than the left, resulting in left-handedness. Another is related to skull compression during birth. Skull compression causes unequal blood flow to the brain hemispheres, thus altering development and resulting in particular brain hemisphere dominance.

This last notion is similar to other theories that left-handedness results from birth traumas, such as premature birth, prolonged labor, breech birth, or other problems.

Michael Corballis and Michael Morgan also proposed that during the development of the embryo, the hemispheres do not develop at the same rate. The right

half develops faster and the left catches up, making it more vulnerable to damage (Coren 1992).

The late Norman Geschwind, a leader in brain research and its effects on education, theorized that the male hormone testosterone might be responsible for handedness. Testosterone is produced in large quantities by the male fetus, while the female produces only a small amount. This hormone slows left hemisphere development in the male fetus. Delayed growth in the left hemisphere accounts for greater frequency of left-handed males. Testosterone also can cause abnormalities in the left hemisphere especially in the language and speech areas. And testosterone affects the maturation of the immune system, leading to allergies or auto-immune diseases in later life. The left-brain abnormality also includes dyslexia, attention deficit disorders, learning disabilities, and mental retardation. All of these problems occur in greater numbers among males than among females (Geschwind and Behan 1982). However, subsequent research has not substantiated this theory.

Genetics Studies

Stanley Coren (1992), a professor of psychology at the University of British Columbia, extensively investigated handedness. In his controversial book, *The Left-Hander Syndrome: The Causes and Consequences of Left-Handedness*, he summarized the basic pattern of human sidedness:

- Nine out of ten are right-handed;
- Eight out of ten are right-footed;

- Seven out of ten are right-eyed; and
- Six out of ten are right-eared.

Many individuals exhibit a mixture of sidedness. If a person's dominant hand and foot are on the same side, that person is called "congruent." If all four measures are on the same side, that person is totally congruent. Women tend to be somewhat more right-sided than men. While 47% of women are congruently right-sided, only 41% of men are.

There always has been a question about a genetic basis for handedness. For instance, a visitor to one of the Kerr family's castles in Scotland would observe that their spiral staircases wind counter-clockwise, in contrast to the clockwise winding of most such staircases. Notably, the Kerrs were known for centuries as fierce warriors; their advantage was being left-handed. That left-handedness also was exhibited in their castle architecture.

Coren studied 459 Canadian families. He then compared the results to eleven other studies of handedness in families and found:

- If neither parent is left-handed, an individual's chance of being left-handed are about one out of ten.
- If the father alone is left-handed, the chance of left-handedness is the same, one in ten.
- If the mother alone is left-handed, an individual's chance of being left-handed doubles to two in ten.
- If both mother and father are left-handed, their offspring's chance of being left-handed is three or four in ten.

The last figure — a 30% or 40% chance of left-handedness when both parents are left-handed — poses a problem for scientists who believe in a single-gene theory for handedness. If left-handedness were a recessive trait and both parents are left-handed, then all of their children should be left-handed. Similarly, studies of twins show that the frequency of same-handedness in pairs of twins does not differ between identical and fraternal twins. These studies suggest that more than genetics is at work in determining handedness.

Some scientists have proposed more complex theories involving multiple sites on different chromosomes and "neutral" or "wild card" genes. Some evidence also exists for more than one gene or combinations of genes linking several traits. One interesting study has an interesting tie to handedness. That study appears to indicate that primary dyslexia is related to chromosome 15. This type of dyslexia is nine times more prevalent in males than females and tends to run in families. These individuals also exhibit early graying, digestive tract problems, chronic allergies, and left-handedness (Jordan 1982).

Is Left-Handedness Unhealthy?

Clearly, many questions about the origins of handedness remain. Perhaps a more immediate question for educators is whether being left-handed is unhealthy in any way.

Sensational headlines still appear: "Wrecked Nervous System Makes Southpaws," "Left Hand: Spoiled

Mind." The mail rained down on Coren when he published *The Left-Hander Syndrome*. Coren related left-handedness to a number of physical problems, such as respiratory problems, arthritis, alcoholism, and early death. He also remarked on left-handed criminals, such as Billy the Kid, Jack the Ripper, John Dillinger, and the Boston Strangler.

Several studies, such as one reported in the *New York Times* in February 1993, have failed to confirm the various physical or psychological dangers that threaten lefties. For example, a study from the National Institutes of Health and Harvard Medical University found no higher risk of early dying among 3,774 left-handed people ("Good News" 1992, p. 2).

School Problems that Left-Handers Encounter

With or without evidence of risks to left-handed individuals, parents, schools, and others routinely have tried to make everyone right-handed. An apt example is Babe Ruth, the famous southpaw baseball player, who was labeled incorrigible and spent most of his youth in Saint Mary's Industrial School for Boys in Baltimore. Ruth considered himself the "complete left-hander." However, all of the boys at the school were forced to write with their right hands. Although Babe threw and batted left, he wrote with his right hand because of his teachers' interventions.

Babe was not alone. A strong cultural bias toward the right hand has forced many natural left-handers to use their right hands for many tasks. In many schools children were hit across the knuckles if they were caught using their left hand. Ralph, a respondent in my survey, told how he would use the right hand when his teacher was looking and then switch as soon as she passed by. He never fully learned to write with the right hand.

Coren (1992) also studied a group of individuals who had been encouraged to change hands. He found that the shift was made successfully in about 57% of the cases. But the change was made only for specific actions and was successful only if training in right-handedness was begun before the third grade. Girls, Coren found, were easier to change than boys.

Virtual "invisibility" of left-handers is a major problem in schools. Most right-handers, including right-handed teachers, fail to realize how different the world is for the left-handed. Coren pointed up this invisibility by describing a study of high school students who were asked about the handedness of their parents. The parents were then asked the same questions. According to the parents' answers, 9% of them were left-handed. But according to the students' answers, only 4% were lefties. Coren concluded left-handers are invisible even to their own children.

Lefthander Magazine reads from back to front and publishes a regular feature called "Perspective," which includes stories about difficulties encountered by left-handed readers as they live in a right-handed world. Right-handers would be surprised at just how many problems exist. Here are some examples in the classroom:

- The pencil sharpener goes the wrong way for left-handers.
- Notebook rings and spiral wires dig into the wrists of left-handed writers.
- Inks (and soft-lead pencils) smudge as a lefty writes if he or she rubs along the paper.

- In classrooms with tablet arm chairs, the writing surface is designed for right-handed students; left-handed tablet arm chairs often are in short supply.
- Standard scissors are designed for right-handed individuals; like tablet arm chairs, left-handed scissors are not common in many classrooms.
- Rulers are subtly biased toward the right-hander.

And the list goes on and on.

Learning to Read and Write

Perhaps the most significant problems for young learners come in learning to read and write. According to Wasylyk (1989), two closely related processes are primary objectives for beginning readers: obtaining meaning from the written word (decoding) and putting a thought into writing (encoding). Many elements of these two processes are similar.

Enstrom and Enstrom (1971) believe that too often children who have initial reading problems are lefties, though there are no significant intelligence differences between right-handed and left-handed learners. They contend that how we read was probably developed by right-handed people. Thus English text reads from left to right because the natural progression of the hands and eyes is from the middle of the body outward. Right-sided individuals naturally look and move to the right; the left-handed to the left.

Diane Paul (1992) in a study in Manchester, England, seems to give some credence to this notion. She found that a significantly larger-than-average number of

Jewish students — 28% — are left-handed. Hebrew books read from right to left. (Open to question is whether left-handed students are more likely to read "left-handed" Hebrew, or whether Hebrew was developed as it is because a large number of Jews are left-handed.)

Enstrom and Enstrom also point out that printed letters tend to "read right." Most letters "open" to the right; examples include L, F, E, C, and so on. The body of the letter is seen first, and the open right side of the letter leads the reader to the next letter. Left-handers must read counter to the natural inclination of their eye movement. Thus it is hardly surprising that many lefties experience difficulty learning to read, often with the specific problem of letter and word reversals.

Some researchers are inclined to believe that left-handedness and dyslexia, in which many words and letters are seen as reversed, are connected. For example, Nelson Rockefeller, a left-hander, often read words backwards and sometimes wrote letters and words in reverse. His father tried hard to change his handedness but with no success. Rockefeller was later diagnosed as dyslexic.

Many modern concepts of dyslexia were developed by Samuel Orton (1937), a physician and early prober into children's reading and speech problems. He believed that the person who read and wrote backwards did so because the dominance of the left hemisphere of the brain had not been established. However, Orton also believed that the suppression of left-handed activities would eliminate the reversals. Today a society for

dyslexics bears his name, but many of his theories are no longer believed. Teachers currently realize that both hemispheres contribute to the learning process and that suppression of left-handedness often is counter-productive.

However, Orton's view prevailed for a long period and was reinforced by other researchers and educators. For example, Dayhaw (1960) suggested that in most cases it would be best to change handedness in order to avoid emotional problems. According to his theory, a left-hander must learn everything a right-hander does, plus overcome such handicaps as desks, the shoving motion that must be used in order to write, smearing ink, and so on. He believed that learning would be harder for left-handers because they would have to transpose everything. If left-handers were changed for these reasons and in an orderly manner, no harm would result.

Another reason to change the writing hand, according to some educators, is that right-handers write faster and easier. However, any experimental investigations of this notion have found no conclusive evidence that this is true. There also is a popular belief that left-handers have inferior writing skills — composing, not penmanship — but that belief has yet to be demonstrated. However, the manual act of writing may be difficult for left-handed students to master in a right-oriented classroom. Thus poor legibility and lack of writing fluency may be factors that keep some lefties from being as successful as their right-handed peers.

One readiness skill for both reading and writing is the development of left-to-right progression. This

motor skill is essential. Time spent on establishing this concept in the handwriting program matches the time needed to train children to move their eyes from left to right in reading.

Problems in Other Subjects

Although reading and writing problems are probably the most serious, lefties also face difficulties in other subjects.

Manual Arts. For the left-hander, many vocational subjects can cause problems. Sewing and cooking utensils are made for right-handers. The standard can opener can be an obstacle for a lefty. Tools in industrial technology classes seem to work backwards for left-handers. Some are hazardous because their use is awkward for the learner who is not right-handed.

Music. Instruments such as the violin, cello, and guitar are strung on the opposite side for left-handers. Some can be restrung for a left-handed player, but instruction manuals and other reading material usually is written with an assumption of right-handedness.

Business Education. White (1986), a professor of business at Lamar University in Texas, states that much has been written about teaching typewriting to students with missing fingers or missing hands. Yet little attention is given to the large number of left-handed students using materials and equipment for right-handed students. For example, students are told to place materials on the right side of their typewriter or computer; most desks are built with typewriter shelves on the right. "A

teacher awareness for handedness of students may bring about better performance in typewriting/shorthand skill development," says White. However, she does note that standard keyboards are left-friendly, because the left hand makes about 60% of the key strokes.

Physical Education. The term *southpaw* comes from a time when baseball parks were built with home plate in the west corner of the field. When a left-handed pitcher faced the batter, his left arm — the pitching paw — was on the south side. Baseball parks have changed, but many of the tools used in physical education have not. Baseball gloves for lefties may be in short supply in school locker rooms. And left-handed golf clubs and bowling balls are rare.

Being left-handed can be a plus in boxing, fencing, and tennis, as it tends to throw off the opponent. But coaches who insist that players dribble with the right hand or start off a run on the right foot can hamper the lefty's development of physical skills. Many left-handers are easily confused about left and right. Even among individuals who are not dyslexic, direction may be a problem that slows their reaction.

Problems with Self-Esteem

Victor Goid (1990) explains that many popular beliefs about left-handedness actually hamper some lefties' development of healthy self-esteem. He cites a few of these beliefs:

1. *Left-handers tend to be flaky.* This belief comes from the current popularity of "left-brain/right-brain

thinking." Popular opinion sees left-handers as right-brain thinkers, meaning that they are impulsive, disorganized, creative, visual thinkers — in a word, "flaky."

2. *Left-handers write in an odd way with their hands hooked.* A recent survey of left-handers found that only 36% used the hooked position. Left-handers vary in their writing skills just as right-handers do.
3. *Left-handers do not live as long as right-handers.* The notion that lefties are poor drivers and so have frequent accidents cannot be proved or disproved because accident reports do not include handedness. This belief seems to go back to lefties' frequent confusion about left and right and relates to the following belief.
4. *Left-handers are clumsy.* Goid asks, if left-handers are so clumsy, how can we account for nimble-handed and fleet-footed lefties who excel in sports, such as Jimmy Conners?

Parents and teachers need to make conscious efforts to become more aware of the problems with which left-handers have to deal. Left-handers live in an environment that is strongly biased in favor of the right-handed. The power of positive role models may enhance the self-esteem of left-handed children by demonstrating that all people are unique and that left-handedness is a quality of many gifted people. For example, three of the last four U.S. Presidents have been left-handed: Gerald Ford, George Bush, and Bill Clinton. Ronald Reagan was born left-handed but was forced to change. Other fa-

mous lefties in history include Charlemagne, Leonardo da Vinci, Raphael, Queen Victoria, Ben Franklin, Robert Morse, Lewis Carroll, and Henry Ford. Famous present-day lefties include Whoopi Goldberg, Oprah Winfrey, Prince Charles, and Norman Schwartzkopf.

Meeting the Needs of Lefties in School

Diane Paul (1992), founder of the Centre for Left-Handed Studies in Manchester, England, studied 1,834 students and 71 teachers in eight Manchester schools and found some situations that are "a scandal in the 1980s." One example was an eight-year-old boy who was forced into right-handedness by a teacher "on the grounds of laziness." Indeed, a 1994 article in a British education journal was titled, "How to Help the Clumsy Child," and described how to help left-handers.

Paul found that while teachers affirmed an interest in left-handedness, the majority had "no standard system" for helping left-handed students. She believes that overt prejudices may have disappeared, but ignorance can be just as hurtful.

The good news for educators and lefties is that many problems that arise in the right-handed school are practical ones that are fairly easy to solve. One of the simplest ways for teachers to help left-handers is to be aware of room organization and personal teaching style.

Lipson (1984), writing in *Academic Therapy*, encouraged special education teachers to establish a physical learning environment for the many left-handed students in their classes. These environmental matters can be addressed by all teachers. Following are several suggestions:

1. Teachers should consider room lighting. If the light from a window comes from the left, the left-handed student's work may be in shadow. The lefty will benefit from arranging the seating so that the light comes from the right. (Of course, the opposite will be true for right-handers.)
2. Teachers should mount one manual pencil sharpener backwards for the left-handers or, better yet, provide an electric pencil sharpener.
3. Right-handed teachers who are demonstrating an activity for a left-handed student, such as cutting a shape out of paper, will have more success by standing in front of the student and asking the student to mirror the activity.
4. Teachers should seek out supplies that help lefties, such as left-handed scissors, quick-drying pens that reduce smearing, and so on. Teachers also should encourage parents to find and purchase left-handed supplies for their children.

Some special needs are tied to particular school subjects. Writing is perhaps the most important of these, but other subjects also merit specific attention.

Writing Needs

Before children come to school, many of them have learned to imitate adults. Most children have picked up pencils to write or draw with little or no instruction. Thus many left-handed children enter school with acquired habits — for example, holding a pencil in a certain way — that may be counter-productive.

The key point for teachers is to treat lefties as individuals, not as exceptions to the (right-handed) rule. Bloodworth (1993) reviewed the handwriting sections of a number of current textbooks and collected the most positive instruction techniques. Accordingly, teachers should:

1. Identify left-handers and plan special support for them, but avoid any attention that may cause them to feel self-conscious.
2. Ask a left-handed teacher or volunteer to model good handwriting techniques. Volunteers might be parents or older students.
3. Instruct left-handers to turn their writing paper to the right, rather than to the left. This enables them to see the work better, to have better leverage, and to write faster. (Many children use an inverted paper position or hook their arm around to write because they were instructed to turn their papers to the left.)
4. Ask students to use a hard lead pencil — for example, a Number 3 instead of a Number 2 — so it will not smear easily.

5. Teach left-handed students to hold their pencils about an inch and a half higher than right-handers, so that they can see over or around their hand; show them how to point their pencils toward their left shoulder.
6. Suggest that left-handed writers keep their wrists nearly flat against the writing surface, and prevent hooking by instructing students to keep their wrists straight and their elbows close to their bodies.
7. Provide a lower desktop for lefties so that they can better see their work.
8. Provide students with extended large-scale practice time using the chalkboard, which will help some left-handed children to avoid hooking their arm to write.
9. Encourage lefties to develop a natural slant that is comfortable for them by positioning the paper to the left side of the desk in front of the left arm so that the writing flow to the right is easier.
10. Begin writing instruction with directional letters, such as F, P, and B, and help the left-handed students to produce the most legible letter forms that they can make comfortably.
11. Allow older children who have developed their writing by hooking their arm, however awkward, to continue to write in that manner.

Wasylyk (1989) adds a note about special writing problems that can occur with both right- and left-handed

students. The hook is developed so that children can see what they are writing. A writing frame now is available that is designed to help the child hold the writing instrument correctly. Wasylyk also adds that sometimes children hold the pencil too tightly, causing muscle fatigue. Placing a piece of tape beside the large knuckle of the first finger gives the student a target area on which to rest the pencil and will lessen finger pressure. If students clench their fingers into their palm when they write, a ball of wadded paper in the palm will help.

Some school districts have had success teaching handwriting using the D'Nealian Handwriting Method. This system takes the left-handed student into consideration. Abandoning the stick and ball print script, D'Nealian letters are made with one line and motion. Tails (monkey tails) make it easier to print and facilitate the transition to cursive writing. The system also emphasizes legibility and does not demand that writing slant to the right. Many left-handed students have difficulty with the right slant. D'Nealian methods permit students to slant to the right, left, or not at all. For information on the D'Nealian method of handwriting, write Scott, Foresman & Company, 1900 E. Lake Ave., Glenview, IL 60025.

A final point also bears mention. So-called primary, or oversize, pencils and line spacing have no significant effect on the ease with which children learn to form letters. Indeed, they actually may impede some children with small hands.

Reading Needs

Teaching reading to left-handers also needs to take into consideration some special issues. The natural tendency of the eyes is to move away from the body in the direction of the student's dominant hand. Therefore, it is easy to see why lefties reverse letters and words more often than right-handed students. Teachers might do well to remember that mirror writing comes with great ease to many left-handers.

Reading is tied to writing in terms of the importance of directionality. Therefore, both subjects require teachers to emphasize left-to-right directionality, first in learning to read and later — but nearly simultaneously — in learning to write. In particular, teachers should closely observe left-handed children, for whom the left-to-right direction may seem unnatural, and should correct any confusion as soon as possible. Once the left-to-right pattern is established, reading instruction may proceed in similar fashion for left- and right-handed children.

Vocational and Physical Education Needs

Vocational subjects are microcosms of a world designed for the right-handed. Whether in home economics, industrial technology, or other vocational subjects, left-handed tools seldom are available for students.

For example, from soup ladles to coffee servers, many of the instruments for cooking and sewing are right-handed. However, left-handed counterparts do exist for many items and should be obtained for classroom use. This is particularly the case for tools that are used frequently, such as scissors.

The same is true for industrial technology classes, from woodworking to auto mechanics. Left-handed tools often exist but are in short supply in schools. Awkward situations can be remedied by teachers who are alert to students' needs and willing to search out left-handed solutions to right-handed problems. And, indeed, many modern machines can be reconfigured easily to accommodate either left- or right-handed operators.

Many students in vocational classes and elsewhere can learn to work left-handed by mirroring the instructor's right-handed movements. By so doing, they can master most handicrafts, for example, knitting, tatting, and crocheting, for which the implements can be used in either hand. The technique extends to hammering, using a screwdriver, sawing a board, and so on. This lesson serves many purposes. Right-handed teachers should remind themselves to demonstrate skills to left-handed students by standing in front of them and asking the students to mirror their movements, which contrasts with instruction for right-handed students, where it works best to stand beside the student so that he or she can copy the movement.

Of course, many of these same principles apply to physical education and sports activities. Schools are beginning to supply left-handed equipment. If schools cannot find funds for left-handed equipment, then parent organizations and individual parents often can fill in the gap. A number of sports magazines have begun to give attention to left-handed participants. And there are even left-handed sports videos, such as "Bob Charles: Golf From the Other Side."

Conclusion

Readers will notice that pictures of Benjamin Franklin playing chess or gesturing with his cane show that he is using his left hand. Franklin was naturally left-handed but was forced to write and eat with his right hand. The pressures placed on left-handers were a frustration to him and stirred him to write an essay titled, "A Petition to Those Who Have the School Superintendency":

> I address myself to all the friends of youth . . . in order to remove the prejudices of which I am a victim. There are twin sisters of us. . . . From my infancy, I have been led to consider my sister as a being of more educated rank. I was suffered to grow up without the least instruction while nothing was spared in her education. She had masters to teach her writing, drawing, music and other accomplishments, but if I touched a pencil, pen, or a needle, I was bitterly rebuked; and more than once I have been beaten for being awkward.
>
> Condescend, sir, to make my parents aware of the injustice. . . and the necessity of distributing this care . . . among their children equally.
>
> I am with profound respect, Sirs,
> Your obedient servant,
> THE LEFT HAND

This letter also could be addressed to teachers, school boards, and colleges of education. The fact is that most right-handers are unaware of the different world for left-handers. The following points of advice may help to address this problem.

First, regardless of the causes of left-handedness, educators can take concrete, practical steps to help children cope with the right-handed bias they face in school, at home, and, in all likelihood, in their future workplace.

Second, educators can refuse to accept the two-mind theory as it has been erroneously applied to handedness. While it generally is recognized that the right-brain dominance determines left-handedness, this does not mean left-handers are "right-brain" thinkers. Studies have shown that learning, thinking, and handedness are not consistent. Not all left-handers are spatial, artistic, or unorganized, just as not all right-handers are methodical and scientific. Talent, learning style, interests, and other factors are individual variables.

Third, teachers and parents must realize that the early years of teaching reading and writing are critical. Handwriting instruction must be tailored to the needs of the individual student.

Fourth, educators should be aware of the school environment in order to notice and correct problems that inhibit learning for left-handed students. Particular attention should be paid to safety hazards, instances when left-handed students may be at risk because of right-handed assumptions.

Fifth, teachers and parents need to attend to matters of self-esteem. Lefties who are labeled "clumsy" be-

cause they have difficulty learning to deal with right-handed operations are ill-served.

Finally, educators should consider a suggestion by Paul (1992) to form support groups for lefties or "southpaw clubs." With awareness and attention, educators *can* meet the needs of all students — including the "invisible" left-handed minority in their classrooms.

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